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ABSTRACT

This teaching unit, Introduction to Fishing, is one in a series of career guides developed by Project CHOICE (Children Have Options in Career Education) to provide the classroom teacher with a source of career-related activities linking third and fourth grade elementary classroom experiences with the world of work. Part of the Agriculture and Ecological Studies Career Cluster, these six lessons about sport and commercial fishing discuss different methods used for fishing jobs associated with the fishing industries and geographical effects and demands for fisheries. An introductory section gives the unit rationale, goals, performance objectives, entry-level assessment, and evaluation. A list of instructional materials, such as films, filmstrips, books, art supplies, and community resources, is included in this section. Each lesson contains a statement of purpose, materials needed for the lesson, an introductory statement, class activities, and a summary activity. Written materials (such as worksheets, surveys, and task cards) are included where feasible. (This guide is one of twenty-four in the series for grades 3 and 4--CE 025 766-789.) (MEK)

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OFFICE OF CLAUDE W. RICHARDSON
KERN COUNTY SUPERINTENDENT OF SCHOOLS

Project CHOICE
#lil - A

A CAREER UNIT FOR GRADES 3 AND 4

INTRODUCTION TO FISHING

(Agriculture and Ecological Studies Career Cluster)

CE 085 778

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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May, 1978

FOREWORD

Project CHOICE: Children Have Options in Career Education, is an Exemplary Project from the San Diego City School District, which has been adapted, with ESEA Title IV-C funding, for Kern County Schools.

Through Project CHOICE, units have been developed to provide the classroom teacher with a source of career-related activities linking classroom experiences with the world of work. All students, regardless of their post-high school plans, share an equal need for career awareness, decision making skills, and other elements of career education. This goal can be accomplished if all teachers and counselors "fit" the appropriate units where they best apply in the curriculum.

We are indebted to the San Diego City School District, and the Project CHOICE staff, for developing and field testing the original units.

For their excellent work in re-writing the units in order to adapt them for use in Kern County Schools, we wish to recognize:

Patricia Alexander
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3

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Agriculture and Ecological Studies
Career Cluster

INTRODUCTION TO FISHING

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AGRICULTURE AND ECOLOGICAL STUDIES
CAREER CLUSTER:

INTRODUCTION TO FISHING

TEACHERS' GUIDE

RATIONALE

Many children are interested in the sea for recreation and fishing. This is a unit wherein students, as a class, will learn about the various aspects of the fishing industry as related to sportfishing and commercial fishing. Consumer needs and conservation will also be investigated.

GOALS

Through this unit, students will:

-Recognize the various types of seafood included in our daily diet.

-Become aware of geographical effects and demands for fishery.

-Learn about the different methods used for fishing.

-Acquire an understanding of the various jobs associated with the fishing industries.

-Gain an awareness of by-products obtained from the sea.

PERFORMANCE OBJECTIVES

The students will be able to:

-State examples of the various ways fish are used.

-Identify jobs related to fishing and sea harvesting.

-List ways scientists contribute to fishery.

-Become aware of California's commercial fishing.

ENTRY LEVEL ASSESSMENT

Use this informal inventory to determine class awareness of the fishing industry:

1. How does fishing help us?

2. What are the various types of fish we eat?

3. What school-learned skills do you think would be used by the fishermen to do this job?

4. How do you think science helps the fisheries?

5. Can you name anything other than seafood that is taken from the sea?

EVALUATION

The final lesson has been set aside for evaluation. The Entry Level Assessment may be used as a pretest as well as a post-test, or the teacher may wish to develop his/her own. Responses may be taped or written, so that comparisons may be made in order to determine how well pupils have achieved the objectives.

SUGGESTED INSTRUCTIONAL MATERIALS

The following materials and equipment should be used in this unit:

-Task cards.
-Films, as listed.
-Library books, as listed.
-Film projector.
-Tapes and recorder.
-Magazines.
-Art materials.
-Maps.
-Sportfishing Information Fact Sheet.

Films:

Arctic Fishermen in World Trade
Food from the Sea
New England Fishermen
Salmon: From Catch to Can
Tuna Fishing
Tuna: From Catch to Can
Tuna Packing
Field Trip to a Fish Hatchery
Deep Frontier
Sea Otter

Books:

Title	Author
Story of California	(State Text)
Cruise of a Tuna Clipper	M. Knowlton
National Geographic Society, Vol. 142, No. 2, August 1972	
National Geographic Society, Vol. 139, No. 2, February 1971	

AVAILABLE IN INSTRUCTIONAL RESOURCE CENTER: OFFICE OF THE KERN COUNTY SUPERINTENDENT OF SCHOOLS
(Please preview first, to be certain of suitability for specific students and situations).

Films:

MP 6538 Tuna Packing
MP 6537 Tuna Fishing
MP 4978 Fieldtrip to a Fish Hatchery

COMMUNITY RESOURCES

Field trips are available through the fish hatchery at Kernville. Contact: U. S. Fish and Wildlife Service for information; 861-4216.

FOR FURTHER INFORMATION

Write the following agencies to request information:

-U. S. Fish and Wildlife Service
Bureau of Commercial Fisheries or
Bureau of Sport Fisheries and Wildlife
Dept. of the Interior
Washington, D.C. 20240

-Sport Fishing Institute
Suite 503
719 13th St. N.W.
Washington, D.C. 20005

-American Fisheries Society
Suite 1040, Washington Building
Washington, D.C. 20005

-Federal Water Pollution Control Administration
633 Indiana Avenue
Washington, D.C. 20242

-American Institute of Biological Sciences
3900 Wisconsin Avenue N.W.
Washington, D.C. 20016

REFERENCES

-Research in the Sea, by P.M. Frye, 1963. Woods Hole Oceanographic Institute, Woods Hole, Mass.
Single copies free.

-Preparation for a Career in Fish Conservation, 1966.
Bureau of Sport Fisheries and Wildlife, Interior Building, Washington, D.C. 20240
Single copies free.

-Training and Careers in Marine Science, 1963.
International Oceanographic Foundation, 1 Rickenbacker Causeway, Virginia Key, Miami, Florida 33149
Single copies free.

-So You Want To Be A Marine Scientist?
Seaquarium Science Series No. 2, Miami Seaquarium
Rickenbacker Causeway,
Miami, Florida
Free on request to teachers, students, and libraries.

-Fish: The Most-Asked Questions, Reprinted from NOAA
National Marine Fisheries Service
Scientific Publications Staff
Room 450, 1107 NE 45th Street
Seattle, Washington 98105

INSTRUCTIONAL STRATEGY: LESSONS 1-6

Lesson 1

PURPOSE — To become aware of the important role the fishing industry plays in providing a valuable supply of food.

MATERIALS

1. Magazines.*
2. Scissors.
3. Paste or glue.
4. Large chart paper.
5. Task cards 10, 11, and 12.

INTRODUCTION — Say: "Today we will begin our unit about fishing. I want you to think and record the different types of seafood that we eat, and that are used in pet foods."

CLASS ACTIVITIES

1. Divide the class into committees. Give each recorder a sheet of chart paper. The children will look through magazines to find various kinds of seafood used in menus and pet foods. Each group will glue their examples to the chart paper, and the recorder will list the type of seafood used.

SUMMARY — The students will present their examples to the class.

Note: *Woman's Day and Family Circle Magazines are a good source, and can be brought to school by the students before unit is started.

Lesson 2

PURPOSE

To help children become aware that people in many parts of the world depend upon the sea for their food.

MATERIALS

1. World maps.
2. Library books about sea life.
3. Paper and pencil.
4. Task cards 2 and 14.

INTRODUCTION

Say: "Men everywhere are turning to the sea for protein, which is vital to a good health. Fish is one of the richest sources of protein and the world's catch continues to climb each year for this abundant source of food."

CLASS ACTIVITIES

1. Have a class discussion about the sea as a source of food. Use maps to identify countries which would likely depend upon the sea for their food.
2. Have students form "brainstorming" groups to make lists of foods which could come from the sea. Have them refer to the library books for information.

SUMMARY

1. Review group lists.
2. Report on task cards.

Lesson 3

PURPOSE To determine the importance of California's fishing industry to that of other parts of our country.

MATERIALS

1. Suggested Films: MP 6537 Tuna Fishing
   and
   MP 6538 Tuna Packing
   (Available through Instructional Resource Center, Superintendent of Schools.)
2. Pencil and paper.
3. Books: Story of California (State Text).
   Cruise of a Tuna Clipper, by Knowlton.
4. Task cards 2, 7, 8, and 17.

INTRODUCTION Say: "California is one of the leading states in the fishing industry. For many years it has been one of the top states in the value of its fishing catch. Today we will see two films that can help us learn about the tuna industry."

CLASS ACTIVITIES

1. View and discuss films.
2. OPTIONAL: Assign reports about commercial fishing in California and other states.
3. Do task cards.

SUMMARY

1. Review important aspects of films.
2. Reports from group using task cards.

Lesson 4

PURPOSE — To show the important part fish hatcheries can play in contributing to the world's food supply.

MATERIALS — Film: MP 4978 Field Trip to a Fish Hatchery (Available through Instructional Resource Center, Superintendent of Schools.)

2. Task card 5.

INTRODUCTION — Say: "Today we are going to learn about fish hatcheries. This is a place where the eggs of fish are taken to be hatched and where small fish are raised until they are ready for use in stocking."

CLASS ACTIVITIES

1. View and discuss film.
2. Do task cards.

SUMMARY

1. Review film.
2. Reports on task cards.

NOTE: Field trips are available through the fish hatchery at Kernville. Contact: U. S. Fish and Wildlife Service for information; 861-4216.

Lesson 5

PURPOSE To allow students the opportunity to explore other aspects of the fishing industry, such as: conservation and education.

MATERIALS

1. All task cards.

INTRODUCTION Say: "Each year the demand for fishery products is greater as the world population increases. Scientists are concerned with such problems as overfishing, and changes in the ocean environment caused by pollution. Oceanographers are interested in forecasting changes in the ocean climate, and currents. The ability to forecast changes in the ocean climate can save American fishermen millions of dollars each year. We have learned much about fishing and sea products. Today I would like you to be able to learn more about the fishing industry, by doing task cards that especially interest you."

CLASS ACTIVITIES

1. Individually work on task cards.

SUMMARY

1. Reports on task cards.

Lesson 6

PURPOSE

To evaluate what the children have learned about the fishing industry.

MATERIALS

1. Chart paper from pre-test.
2. Entry level assessment.
3. Task cards (all).
4. Tape recorder.
5. Tape.

INTRODUCTION

Say: "Today we are going to find out how much we have learned about the fishing industry. First, let's look at our chart paper we constructed before we began our unit. Let's find out how much more we now know."

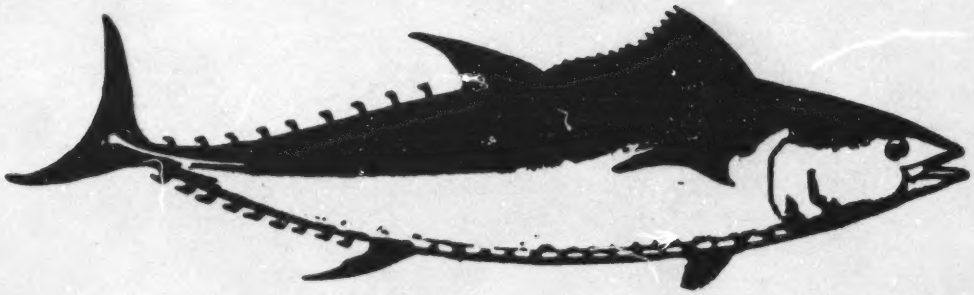
CLASS ACTIVITIES

1. Discuss chart paper from pre-test.
2. Make a tape as a post-test.
3. Free use of task cards.

SUMMARY

The tape acts as a summary for the unit. During taping, discuss with children their opinions regarding this unit. What were the things they liked, and what were the things they did not like?

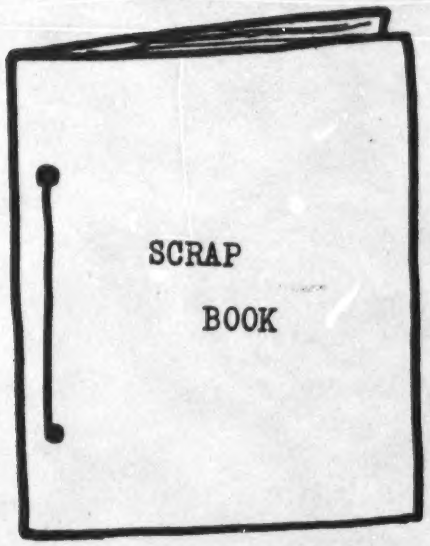
BIGGEST FISH EATERS



You need:

1. Paper.
2. Pencil.
3. Encyclopedia

Japan consumes more than three times as much sea food as does the United States, and is one of the largest sea harvesters. Do some research on Japan to find out why this country is so dependent upon the sea for food. Be prepared to give a report to the class.

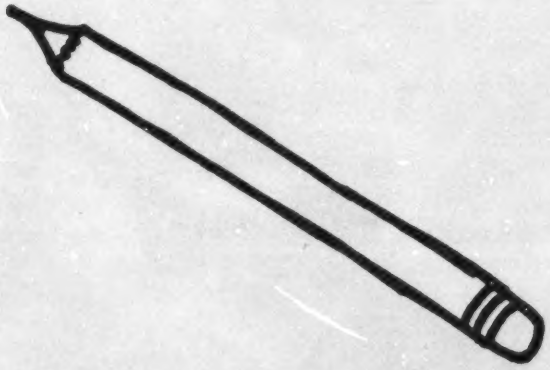


You need:

1. Newspapers.
2. Construction paper.
3. Scissors.
4. Paste or glue.

Look through the newspapers for articles about the fishing industry. Neatly cut out the articles and paste them on construction paper. Design a cover. This scrapbook can be used by the class for reports.

WRITE FOR A CAREER GUIDE



You need:

1. Paper.
2. Pencil.
3. Envelope.
4. Stamp.

Write to:

American Fisheries Society
1040 Washington Building
15th Street & New York Avenue, N.W.
Washington, D.C. 20005

Ask for their pamphlet "Fisheries As A Profession, A Career Guide for the Field of Fisheries Science." Be sure to use your best handwriting, and include your return address.

CATCH THAT FISH!

You need:

1. Paper.
2. Pencil.
3. Sportfishing Information Sheet. (Task card 4A.)

All sportfishermen hope to catch the <u>big</u> one.

1. What are the names of fish that commercial fishermen catch also?

2. You are the captain; make a list of clothing to be worn aboard your ship.

3. Explain to your customers why it is necessary to conserve water during the cruise.

4. Write an advertisement for your fishing boat, stating the advantages you offer for fishing parties.

SPORTFISHING INFORMATION SHEET

NAMES OF FISH

- Albacore
- Barracuda
- Dolphin
- Flying fish
- Lobsters
- Marlin
- Rooster fish
- Sailfish
- Shark
- Sea Bass
- Tuna
- Wahoo
- Yellow Tail
- Whale

FISHING EQUIPMENT USED

- Bait
- Fishing line
- Fishing reel
- Fishing rod
- Gaff
- Hook
- Leader
- Live bait
- Needle
- Socket belt
- Swivel
- Thread

BOAT EQUIPMENT

- Anchor
- Bow
- Ice box
- Keel
- Life preservers
- Port side
- Rope
- Small boat
- Starboard
- Stern

DICTIONARY

- Aft - toward the back
- Beam - width of ship
- Below - downstairs
- Bilge - lowest part of ship
- Bow - front of ship
- Bridge - captain's control area
- Bulkhead - vertical partitions between areas
- Bunk - built-in bed
- Cabin - room
- Companionway - corridor
- Draft - depth of vessel below waterline
- Forecastle - most forward area of ship (pronounced folk-sul)
- Galley - kitchen
- Keel - lowest structure of ship
- Overhead - ceiling
- Port - left side, facing forward
- Pulpit - for harpooning fish
- Reefer - frozen food locker
- Starboard - right side, facing forward
- Stern - back of ship
- Swim step - for boarding
- Topside - upstairs.

FISH LADDERS

You need:

1. Paper.
2. Pencil.
3. Encyclopedia.

Chinook salmon, coho salmon, and steelhead have been raised in ponds. How are fish ladders used to hatch these fish? You will have to do some research on your own.

1. Where are these ladders used?
2. What happens to salmon after spawning?

IF YOU LIVED IN AN IGLOO
HOW WOULD YOU FISH?

You need:

1. Paper.
2. Pencil.
3. Encyclopedia.

Look up information about Alaska. What kind of fishing is done there?

1. List the type of fish caught.
2. What kind of equipment do Eskimos use?

POINT OUT THE DIFFERENCE

You need:

1. Pencil.
2. Paper.
3. Encyclopedia, or
   The Fishes, Life Natural Library
4. Drawing paper.

Tell about the Drift Net, the Purse Seine, and the Trawl Net. Draw a picture of each type, and be ready to show them to the class when you give your report.

YOU ARE THE CAPTAIN!

You need:

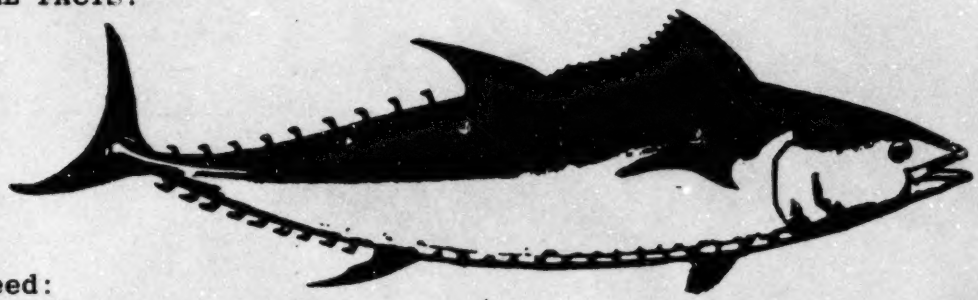
1. Paper.
2. Pencil.

You are the captain of your own tuna boat. Your crew is ready to sail, but you are waiting for the Tuna Boat Association to accept a bid from the canneries.

1. How do you feel about the delay?
2. How does your crew feel? Why?

Be prepared to give this report to the class.

GET THE FACTS!



You need:

1. Paper.
2. Pencil.
3. Envelope.
4. Postage stamp.

Write a letter to the

Sport Fishing Institute
719 - 13th Street N.W.
Washington, D.C. 20005

Ask for information about the following:

1. Research in fish biology.
2. Fish conservation education.
3. Professional service to official agencies and key citizens groups.

A FISHY TASK!

You need:

1. Magazines.
2. Scissors.
3. Glue or paste.
4. Large poster paper.

Cut out pictures and recipes of meals and snacks that are made with seafood. Arrange the pictures and recipes according to the type of seafood used. Paste to poster paper.

FELIX'S FAVORITE!

WHAT'S IN IT?

You need:

1. Paper.
2. Pencil.
3. Magazines.
4. Large poster paper.

Look through magazines for advertisements of pet foods. Or, visit your local supermarket's pet food section. Notice the content. List as many kinds of pet food that contain seafood. Paste advertisements and list of products to poster paper.

WHAT'S YOUR CHOICE?

You need:

1. Paper.
2. Pencil.

1. Visit your local supermarket and interview the manager. Ask him what kind of seafood is most often purchased.

2. Do some research to find where this favorite seafood is found.

3. Determine what type of fishing or harvesting was used by fishermen.

Use Your LOCAL

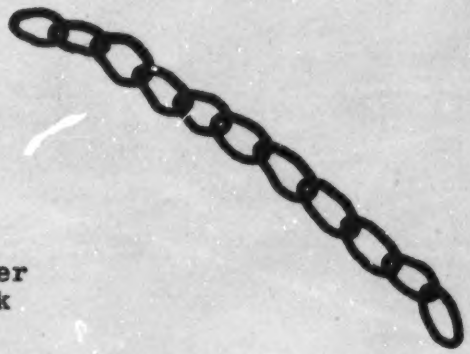
You need:

1. Telephone book.
2. Paper.
3. Pencil.

1. Search through the yellow pages and list the businesses that offer supplies and services for fishermen. Include the firm's name, address, and telephone number.

2. Select a few names and write for information about their fishing equipment. Be specific; ask for their recommendations as to which type is best for sportfishing.

THE SEA'S FOOD CHAIN



You need:

1. Fact sheet on "Order of Preying." (Task Card 14A.)
2. Pencil.
3. Paper.

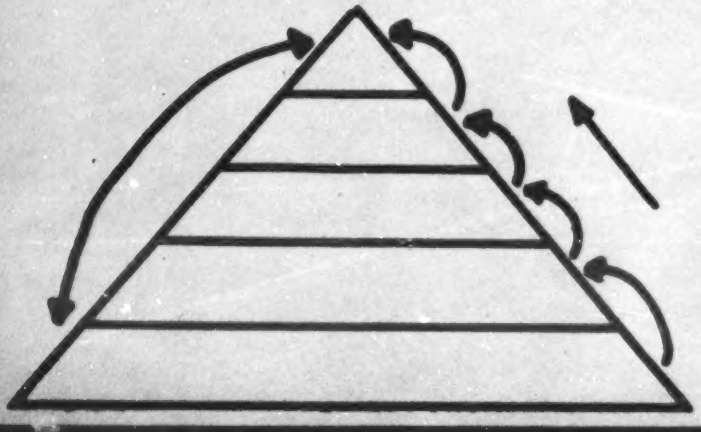
Explain why photosynthesis, the manufacturing of food in green plants, is important to the food chain. List the order of preying. Explain what the arrows mean.

FACT SHEET - ORDER OF PREYING

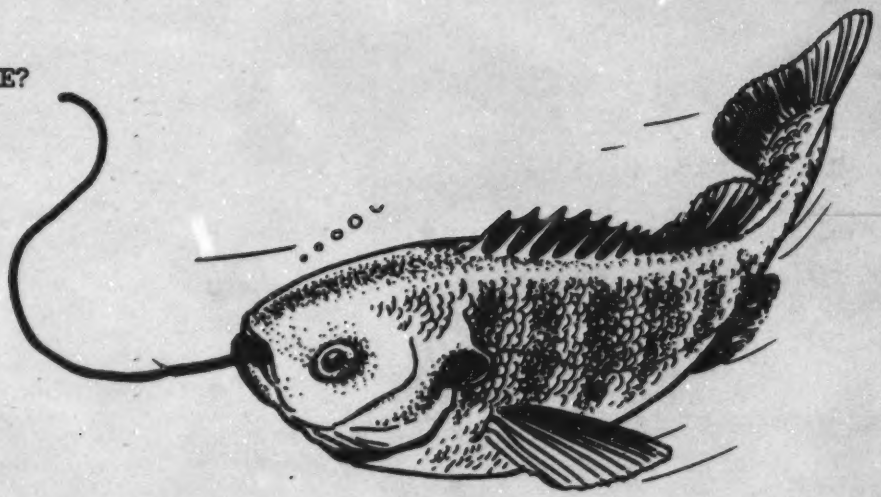
The sea is the home of many types of living things ranging from tiny creatures to the giant blue whales. Since many people are dependent upon the sea for food, it is important to understand the food chain in the ocean. This in turn, will explain the order of preying. In the sea, the life cycle is nourished by sunlight through the process called photosynthesis.

This is a process that converts energy for living plants from water and carbon dioxide, which is a colorless, odorless gas, by the action of sunlight on the green coloring matter of plants. These plants are called phytoplankton. They are the food for the zooplankton, which are the micro-scopic animal and plant life found floating or drifting in the ocean or in bodies of fresh water.

The zooplankton feed the flesh-eating small fish, which in turn, is the food of the larger fish and whales. Man is last in the order of preying since he feeds on the larger fish and whales.



WHAT'S YOUR LINE?



You need:

1. Paper.
2. Pencil.

Advertisers work hard to make the products of their clients appeal to consumers. Write an ad introducing your new fish product. Remember to make your ad interesting so that people will want to buy your client's product.

WE USE SEAWEED?

You need:

1. Felt pens.
2. Poster paper.
3. Magazines.
4. Scissors.
5. Paste or glue.

Look through magazines for pictures of products that are made with kelp (seaweed). Arrange and paste your pictures to poster paper. Label your pictures, and give a report to the class on who uses these items.

OFF LIMITS!

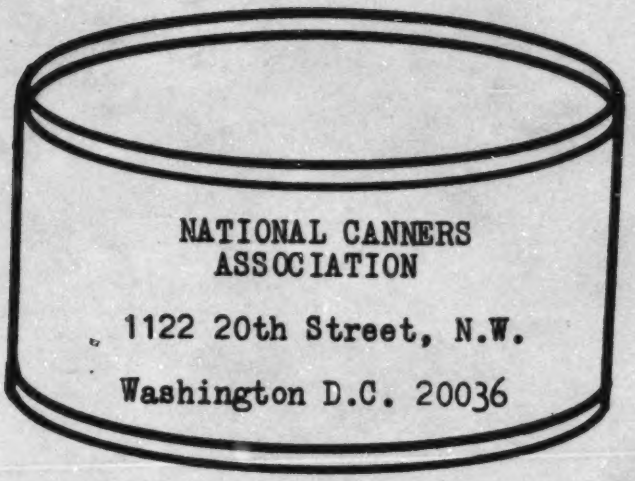
You need:

1. Paper.
2. Pencil.
3. Encyclopedia.

Find out about territorial off-shore limits. What is it for the United States? What is it for Peru, where many of our fishing boats have been seized?

1. How do you think the crew feels when their boat is seized and fined by a foreign country?

2. What happens to the crew's profit when this happens?



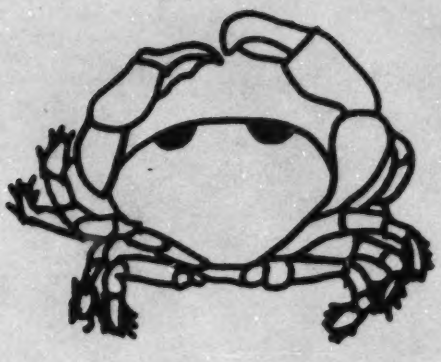
You need:

1. Paper.
2. Pencil.
3. Stamp.
4. Envelope.

Write the National Canners Association for information about fish canneries. Use your best handwriting, and be specific. Ask for information regarding:

1. Health standards.
2. Types of fish canned.
3. Location of canneries.

WHAT'S THE ANSWER



You need:

1. Copy of Fish: The Most-Asked Questions. (Task card 19A.)
2. Paper.
3. Pencil.

Find the answers to the following questions:

1. How many kinds of tuna are there, and which kind makes up the biggest catch?
2. How much shrimp is produced in the United States, and where is the largest catch taken?
3. What is the difference between soft- and hard-shell crabs?

Fish: The Most Asked Questions

Excerpts from the NOAA bulletin, 1973, National Marine Fisheries Service

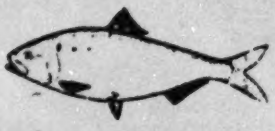
Marine Finfish

Is life found at all depths in the ocean? The question was settled in 1960, when Piccard and Walsh reported a swimming animal, resembling a sole or other flatfish about a foot long, at 35,800 feet deep, observed from a porthole of the bathyscaphe Trieste.

Some scientists believed, as recently as 1860, that marine life could not exist below 1,800 feet. That view was altered when a telegraph cable laid in the ocean bottom at 6,000 feet deep was retrieved and found covered with many forms of marine life.

How many fish species are there? The most oft-quoted estimate is 20,000. There may be as many as 20,000 more.

Which is the oldest fish, as a class? The most primitive fish-like animals are those with sucking mouths, such as lampreys and hagfishes, whose evolution stopped short of the development of biting jaws. Mainly bottom-dwellers, these animals are of great interest to zoologists, for many parts of their bodies show forms and functions that help to explain some of the evolutionary steps leading from low to advanced life forms.



What is the world's largest fish? The smallest? The largest is the whale shark, which grows to more than 50 feet in length and may weigh several tons; second largest is the basking shark, which may measure 35 to 40 feet long. The smallest fish is the tiny goby, an inhabitant of fresh-to-brackish-water lakes in Luzon, Philippines. It seldom is longer than a half-inch at adulthood, yet is so abundant it supports a fishery.

How long do fish live? A few weeks or months (some of the small reef fishes) to 50 years or more (sturgeons). Longevity information is still sparse, but scientists have learned that species live 10 to 20 years in temperate waters.

Do some fish give birth to living young? Yes, many do. These are called viviparous fishes. The sea perches of the Pacific coast, for example, give birth to living young of considerable size, sometimes one-fifth the size of the mother. Several kinds of sharks produce living young.

Do fish breathe air? Yes, but not directly into the lungs as

mammals do (except for some tropical fish). As water passes over a system of extremely fine gill membranes, fish absorb the water's oxygen content. Gills contain a network of fine blood vessels (capillaries) that take up the oxygen and diffuse it through the membranes.

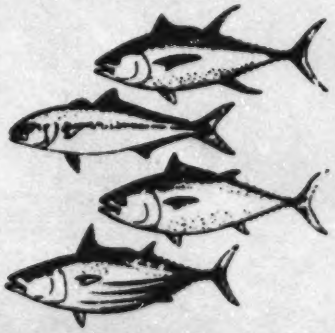
How do fish swim? How fast? Primarily by contracting bands of muscles in sequence on alternate sides of the body so that the tail is whipped very rapidly from side to side in a sculling motion. Vertical fins are used mainly for stabilization. Paired pectoral and pelvic fins are used primarily for stability when a fish hovers, but sometimes may be used to aid rapid forward motion.

Tunas and tuna-like fish, billfish, and certain sharks are the speed champions, reaching 50 miles per hour in short bursts. Sustained swimming speeds generally range from about 5 to 10 miles per hour among strong swimmers.

Can fish swim backwards? A number can, but usually don't. Those that can are mostly members of one of the eel families.

Do all fish swim in the horizontal position? Most do. The sea horse is among the exceptions. Another is the shrimp fish of the Indian Ocean, which congregates in schools of several individuals and swims vertically, its long tube-like snout pointing directly upward. A catfish indigenous to the Nile and other African rivers, also swims in the vertical posture. Many kinds of midwater deep-sea fishes swim or rest vertically.

How many kinds of tuna are there, and which kind makes up the biggest catch? There are seven commercial and sport-caught tunas, as well as several related species, all of which are members of what is called the scombrid family. Commercially caught tunas consist of albacore, bigeye, blackfin, bluefin, bonito skipjack, and yellowfin. Yellowfin, taken in the eastern Pacific and tropical Atlantic, makes up the biggest U.S. commercial catch. Albacore, caught in the eastern Pacific, is the true "white-meat" tuna; skipjack, caught throughout the world in tropical and subtropical waters, makes up the second largest U.S. commercial catch; bigeye is caught mostly in tropical waters; blackfin is caught commercially only in the Caribbean and off South America; the very large bluefin (rod-and-reel record, 1,040 pounds) is a highly prized sport catch in the Atlantic and Pacific; and the widely distributed bonito is used largely as pet food.



How do porcupine fish inflate themselves? All puffer-like fish inflate by pumping water into special sacs when in their natural environment. Out of water, a puffer fills the sacs with air instead, and takes on a balloon-like appearance.

What attracts sharks? Which are most dangerous? Considerable research has been devoted to finding out what stimuli attract sharks and incite them to attack. Results are mostly inconclusive, but some general principles have been advanced: Certain types of irregular sounds—like those made by a swimmer in trouble or a damaged fish—seem to attract sharks from great distances. Sound, rather than sight or smell, seems to be a shark's primary cue for moving into an area. Some scientific experiments indicate that sharks can distinguish light colors from dark, and that they may even be able to distinguish colors. Yellow, white, and silver seem to attract sharks. Many divers maintain that clothing, fins, and tanks should be painted in dull colors to avoid shark attacks.

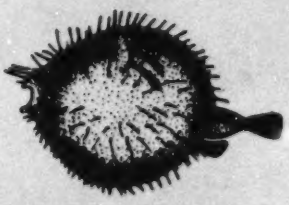
Though blood itself may not attract sharks, its presence in combination with other unusual factors will excite the animals and make them more prone to attack.

The most dangerous species in order of documented attack records are: the great white shark, bull shark, tiger shark, grey nurse shark, lemon shark, blue shark, whaler shark, sand tiger, several species of hammerheads, and the mako. Some species such as the nurse shark are extremely sluggish and have poorly developed teeth, but even these have been known to attack man when excited or disturbed.

Is it true that salmon return to spawn in freshwater areas where they were born? Almost always. Some straying has been documented, but it is minor. Most spawning salmon return to the precise stream of their birth, sometimes overcoming great distances and hazardous river conditions to reach home.

How large do salmon get? Weights of 100 pounds and slightly over have been reported from European countries for the Atlantic salmon; the record for the largest of the Pacific species, chinook, is 261 pounds for a fish caught on commercial gear in Alaskan waters.

Why are fishladders constructed? A fishladder, or fishway, often used in salmon country, is constructed to provide for upstream passage of fish over a dam or a natural barrier that might prevent or impede progress to spawning grounds.



How does a lobster grow? It sheds its hard shell and grows a new, larger one. Since the skeleton is on the outside, this molting is essential to growth.

How many times must a lobster molt before it reaches market size? Between 20 and 30 molts take place before a lobster reaches the one-pound market size.

How old is a one-pound lobster? No one knows exactly, but aquarium studies suggest 5 to 7 years.

How many one-pound lobsters are needed for a pound of lobster meat? Five, on the average.

Can crabs swim? Most crabs "walk" or run across the ocean bottom. Some, such as the commercially caught blue crab of the Atlantic coast (a member of the one family of "swimming crabs") can swim. Their rearmost pair of legs is modified for swimming and legs are paddle-shaped.

Is a stone crab harmed when its large claw is broken off? Fishermen often break off the large claw and throw the crab back into the water. If the break is made at the first joint, the crab is not harmed. The stone crab can and does sever its own claw at the first joint (by muscular contraction) to escape from danger.

How much shrimp is produced in the United States, and where is the largest catch taken? The annual catch has been running close to 400 million pounds for several years. The Gulf States usually lead in shrimp catches, with Texas and Louisiana the leading States. Alaska has been an important shrimp producer for the past several years. The shrimp fishery has the highest market value of all U.S. fisheries.

What do oysters and clams eat? Called filter feeders, oysters and clams eat plankton. By pumping water through their bodies, the mollusks strain the microscopic organisms through their gills, which act as sieves.

What is the biggest clam caught and eaten in the United States? The geoduck (pronounced gooey-duck) clam caught in Northwest Pacific waters, weighs an average three pounds and yields over a pound of flavorful meat. Now sold commercially, geoduck clam meat can be used in minced form or in steaks.

How do oysters produce pearls? Pearls begin with the presence of a foreign substance, such as a grain of sand, that lodges in the shell. The oyster's body reacts by depositing layers of nacreous (pearlike) material around the foreign body to wall it off and reduce irritation.

Do all oysters produce pearls? Many oysters—as well as some clams and mussels—manufacture material like the pearl producing substance. True pearl-producing oysters, however, inhabit waters of the Indo-Pacific.

What purpose do the holes along the edge of an abalone shell serve? Internal gills discharge water through the holes, as part of an abalone's respiratory process.

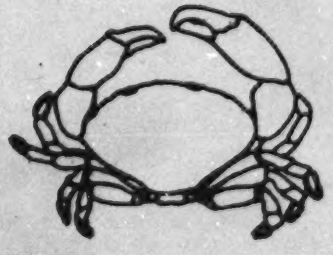
What is the sand dollar that one often sees on beaches at low tide? A sand dollar is the egg case made by moon snails, of the family Naticidae. The eggs are laid in a gelatin-like matrix with which sand grains are mixed. The individual egg capsules can be seen under a magnifying glass or microscope. When the little snails hatch, they swim around for awhile before settling on the bottom.

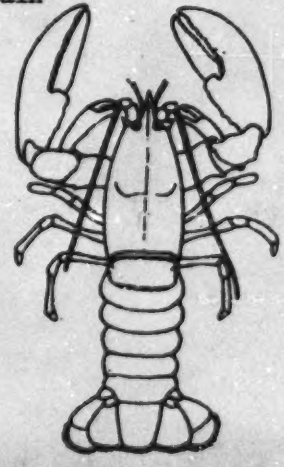
How unsafe are shellfish from polluted waters? They are dangerous to man, causing mild to severe illness, sometimes death. Both sewage and industrial wastes can affect shellfish.

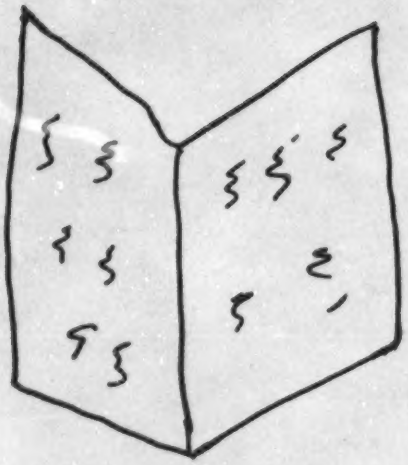
Have people been poisoned by eating lobsters that were allowed to die before being cooked? Is it true that a dead lobster deteriorates very rapidly? What happens when a live lobster is frozen? Lobsters are not poisonous if they die before cooking, but cooking should not be delayed. Many lobsters sold commercially are killed and frozen before cooking. Lobsters and other crustaceans do spoil rapidly after death, which is why many buyers insist on receiving them alive. If the lobster is "headed" before or soon after death, the body meat will keep fresh longer. This is because the so-called head includes the thorax, the site of most of the viscera and gills, which spoil much more rapidly than claw or tail meat. Freezing slows deteriorative changes and harmful chemical actions that follow death.

How do crabs grow? By shedding their outgrown shell. The rigid shell imprisons the crab and limits growth. Once the shell is shed, the crab can absorb water and expand into its newgrown shell.

What sea creatures other than sharks may be dangerous to swimmers? The barracuda (though, divers claim its ferocious reputation is undeserved), moray eels, octopuses, and sharp-spined sea urchins can be dangerous to swimmers. The Portuguese man-of-war has tentacles up to 50 feet long with specialized cells that produce painful stings and welts on contact by swimmers. Sting rays, toadfish, catfish, and jellyfish can inflict damage on swimmers and waders. Certain coral-reef organisms are to be avoided by divers.







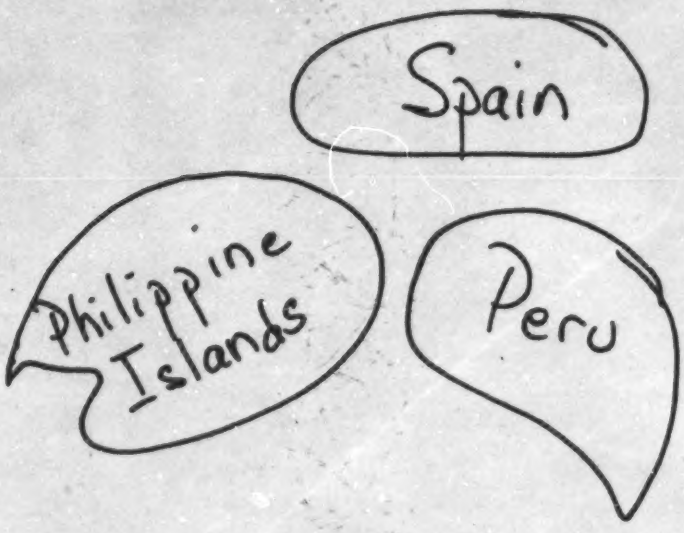
You need:

1. Newspaper.
2. Pencil.
3. Paper.

Fishing Dispute!!

National jurisdictions and rights to use waters bordering on individual nations are often under dispute. The people who listen to these disputes need to speak the languages of the countries involved. Look in the newspaper. Can you find an article about such a dispute? What countries are involved? What languages are spoken? Share your findings with the class.

TASK CARD 21



RESEARCH

You need:

1. Encyclopedia.
2. Pencil.
3. Paper.

Fishing fits into the total economy of our country differently from the way it fits into the economy of other countries. Select one of the countries mentioned above or one that you like. Use the encyclopedia to help you prepare a report on the importance of fishing to the economy of the country you select. Share your findings with the class.